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AN APPRAISAL OF THE BOMBING OF NORTH VIETNAM

(THROUGH 14 DECEMBER 1966)

DECEMBER 1966

S-1113/AP-4

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The Central Intelligence Agency
and
The Defense Intelligence Agency

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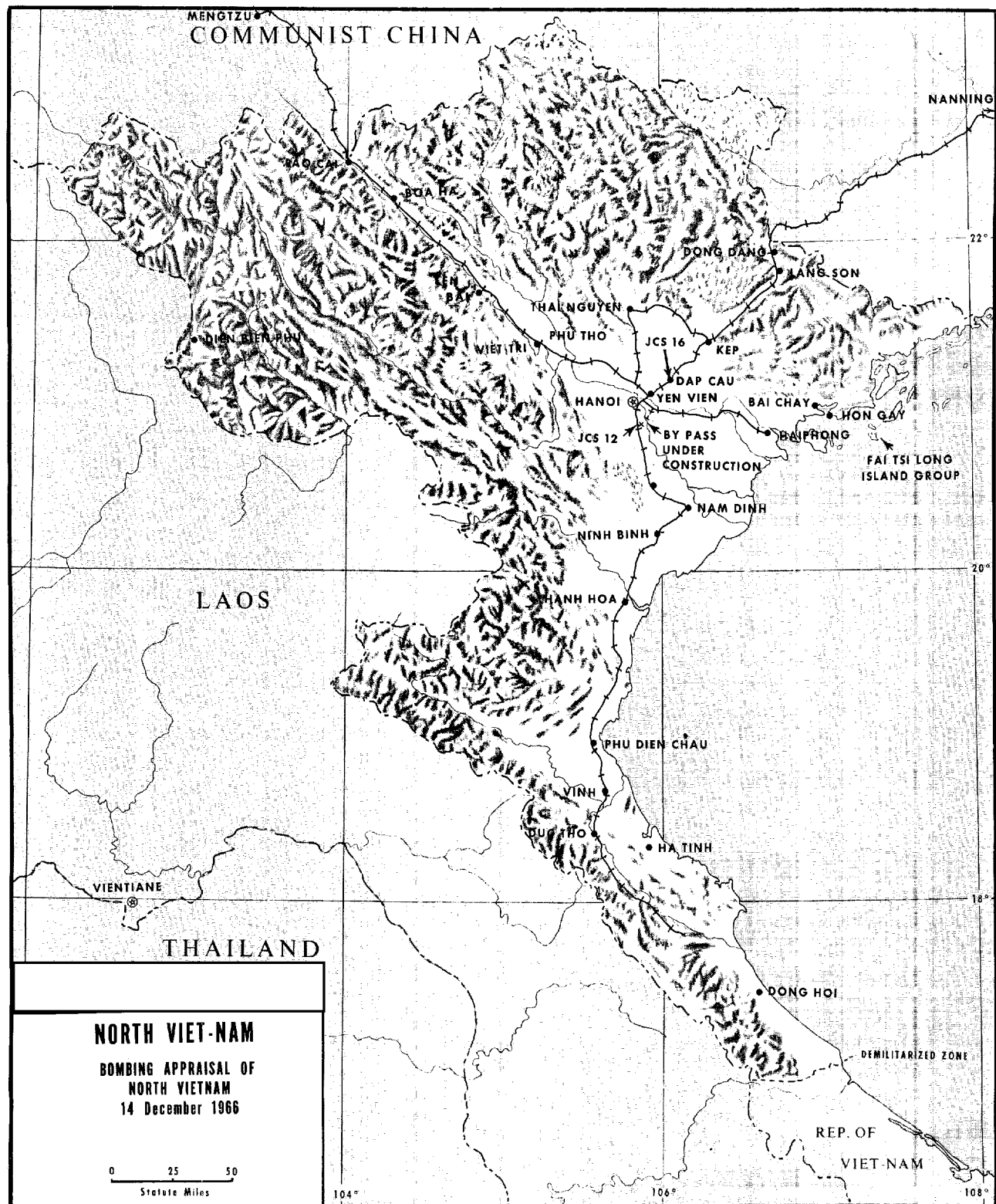
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AN APPRAISAL OF THE BOMBING OF NORTH VIETNAM THROUGH 14 DECEMBER 1966

FOREWORD

This report is prepared on a monthly basis at the request of the Secretary of Defense for an evaluation of certain effects of the ROLLING THUNDER program. The report covers three general areas of concern: Effects on Military Targets; Leadership and Public Reactions; and Effects on the NVN Economy. The discussion of political effects is limited to those developments within North Vietnam which relate to Hanoi's attitude toward continuing the war and the effects the ROLLING THUNDER attack has on civilian morale in North Vietnam.

NORTH VIETNAMESE RAILROAD SYSTEM



AN APPRAISAL OF THE BOMBING OF NORTH VIETNAM
THROUGH 14 DECEMBER 1966

SUMMARY

25X1 1. [] The preponderance of air strikes against North Vietnam during the reporting period continued to be against lines of communications (LOCs). Consistently poor flying conditions limited the number and effectiveness of the strikes and less damage was inflicted on the LOCs than in the latter part of October and early November.

25X1 2. [] The North Vietnamese continued to improve and construct alternates to the rail system, including a major rail bypass of Hanoi and the Hanoi Railroad/Highway Bridge over the Red River. As a result, railroad capabilities were at their highest level since the bombing standdown in January 1966.

25X1 3. [] There was a marked decrease in damage to both moving and fixed highway targets during the reporting period. A significant exception was the increased road cratering in the northwest sector. However, the bulk of the road cuts or cratered segments reported were on the principle roads south of the 20th parallel.

25X1 4. [] Air strikes against inland waterway transshipment and related facilities have reduced the efficiency of operations, but have not appreciably affected water transport capabilities.

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The attack against coastal shipping operations has deprived the North Vietnamese of the use of larger, more efficient coastal carriers and has severely restricted the use of established port facilities outside the sanctuary areas.

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5. [] The North Vietnamese air defense system continued to expand with the acquisition of additional AAA weapons and radar equipment. SA-2 firing and jet fighter reactions increased sharply in early December in response to the stepped up bombing sorties.

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6. [] The cumulative effects of the US air strikes continue to limit the North Vietnamese capability for overt aggression. However, North Vietnam retains its capability to continue to support activities in South Vietnam and Laos at present or increased combat levels and force structures.

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7. [] The North Vietnamese reacted sharply to the early December US air raids on targets in the Hanoi area with propaganda denunciations of the US. Despite regime protestations of the high state of popular morale and of popular determination to defeat the US, isolated instances of dissatisfaction continue to be reported indicating that the air strikes are having some deleterious effect on popular morale. In addition, there continue to be reports of shortages of consumer commodities and difficulties associated

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with the evacuation of large numbers of the population. There is no good evidence, however, to indicate that there has been any weakening in the leaderships resolve to continue the war.

25X1 8. [] Air strikes continue to contribute to North Vietnamese agricultural problems. Hanoi's official statements suggest that the fall rice crop is below average. Recent information also indicates that air strikes have seriously interfered with fishing activity. It is estimated that there has been about a 10 per cent decrease in salt water fish production since the air strikes started.

25X1 9. [] The unloading time of large tankers at Haiphong harbor has lengthened from the pre-July average of 7-8 days to 20 days due to the destruction of tanker discharge facilities. It is estimated, however, that supplies of petroleum in North Vietnam have not dropped below about 60 days supply at any time since 1 September.

25X1 10. [] The extent of damage caused by the air strikes against North Vietnam since the beginning of the ROLLING THUNDER program has been recomputed to incorporate more complete and later information regarding the effects of the attacks. Cumulative measurable losses to the economy and to the military establishment through November 1966 are now estimated at \$184 million.

Effects on Military Targets

25X1 1. [] The preponderance of air strikes against North Vietnam during the reporting period continued to be against lines of communication (LOCs). Consistently poor flying conditions limited the number and effectiveness of the strikes and less damage was inflicted on the LOCs than in the latter part of October and early November. Transport capabilities in general continued to improve. Few significant transport targets were destroyed and inventories of railroad rolling stock, trucks, and watercraft were not significantly changed. The air defense system continued to expand with the acquisition of additional AAA weapons and radar equipment.

25X1 2. [] Railroad capabilities were at their highest level since the bombing standdown in January 1966. There was no disruption of service on the Hanoi-Hiaphong and Hanoi-Thai Nguyen lines. Service on the Hanoi-Dong Dang line was interdicted for approximately two days when two spans of the Dap Cau bridge [] were destroyed on 4 November. The North Vietnamese quickly restored through rail service on this line by activating a bypass bridge. Construction of bypasses to critical bridges, such as the Dap Cau bridge []

25X1 [] have reduced the impact of air strikes and have significantly increased the North Vietnamese

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capability to move supplies. Through traffic on the Hanoi-Lao Cai line between Lao Cai and Viet Tri was possible except for a total of about one week. The necessity to ferry freight cars over the Riviere Claire near the destroyed Viet Tri bridge, however, limits the capability of the southern portion of the line. The North Vietnamese probably restored the Hanoi-Vinh line for light through traffic during the latter half of November. This is the first time the Vinh line apparently has been operable over its entire length for any significant length of time since January 1966.

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3. [] The North Vietnamese continued to improve and construct alternates to the rail system during the reporting period, including a major rail bypass of Hanoi and the Hanoi Railroad/Highway Bridge [] over the Red River. This bridge is the largest and probably the most important rail bridge in the country since all major rail lines except the Hanoi-Vinh line use it for access to Hanoi. The bypass when completed will permit the southward movement of supplies from Haiphong, Dong Dang, and Lao Cai without first passing through Hanoi. In connection with the bypass line three rail ferry facilities are being constructed for use across the Red River.

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4. [] Damage inflicted on railroad rolling stock was at an all time low during November. In early December, however, the

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important Yen Vien Railroad Yard, located five miles northeast of Hanoi was attacked several times. This yard normally contains large amounts of rolling stock. Pilots reported heavy damage to the yard but no assessment has yet been made of the number of rolling stock destroyed.

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5. [] There was a marked decrease in damage to both moving and fixed highway targets during the reporting period. A significant exception was the increased road cratering in the northwest sector. However, the bulk of the road cuts or cratered segments reported were on the principal roads south of the 20th parallel. In this region, Route 1A received heavy-to-intermittent cratering from the DMZ to Ha Tinh. Route 15, the inland north-south artery, was also struck and suffered temporary but significant hinderance to movement. Damage to highway structures has affected the pattern of truck movement in the North Vietnamese Panhandle; a combination of routes and bypasses, in conjunction with the main arteries, are probably now being used for southward movement of military cargoes. The small vehicle count during the period is probably the result of limited observation capabilities rather than any reduction in traffic. Truck traffic in Military Region IV apparently continued to be hampered by heavy rains in November, but there is no evidence of a significant decrease in the volume of supplies moved.

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6. [] The heaviest concentration of strikes on the intra-coastal waterway was between Thanh Hoa and Vinh, resulting in the

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harassment of movement on that important north-south route. Coastal activity in the vicinity of Dong Hoi remained high during November, but sightings decreased sharply during early December -- probably due to the success of destroyer operations south of the 18^o parallel. Air strikes against inland waterway transshipment and related facilities have reduced the efficiency of operations, but have not appreciably affected water transport capabilities because of the North Vietnamese ability to improvise, restore, or relocate their transfer operations.

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7. [] The cumulative effect of the air interdiction effort against coastal shipping operations has deprived the North Vietnamese of the use of larger, more efficient coastal carriers and has severely restricted the use of established port facilities outside the sanctuary areas. Strikes directed against facilities at Bai Chay and other naval support areas scattered throughout the Fai Tsi Long island chain have limited naval operations and forced the North Vietnamese to disperse their naval support facilities. The chart at Tab A contains the results of strikes on North Vietnam.

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8. [] The North Vietnamese air defense capability continues to improve.

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The count of conventional AAA guns also continues to increase, mainly in 85-mm and 100-mm weapons. Massive concentrations of fire-power are located around Hanoi, Haiphong, and along the major LOCs. Nine major AAA concentrations near key areas contain approximately 42 per cent of the total country inventory of AAA weapons.

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9. [] SA-2 firings increased sharply. From 14 November through 14 December an estimated 278 SA-2 missiles were fired and downed seven US aircraft. On several occasions multiple SAM firings were recorded. The greatest number of firings in one day occurred 2 December when 88 SA-2 firings were reported. There have been indications that SAM deployment patterns in and around the Hanoi and Haiphong complexes may be stabilizing.

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10. [] North Vietnamese jet fighter reactions to ROLLING THUNDER operations increased sharply in early December in response to the stepped up bombing sorties. North Vietnamese losses from 14 November were two MIG-21s and one MIG-17 destroyed and an additional MIG-17 probably destroyed. These losses have not significantly reduced the North Vietnamese air defense capability.

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11. [] A major complication caused by the air operations is the requirement to operate the military logistics and maintenance activities from a dispersed base. The cumulative effects of the US air strikes continue to limit the North Vietnamese capability for

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overt aggression, however, they retain the capability to continue to support activities in South Vietnam and Laos at present or increased combat levels and force structures.

Leadership and Public Reactions

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12. [] The North Vietnamese reacted sharply to the early December US air raids on targets in the Hanoi area with propaganda denunciations of the US and a Foreign Ministry statement. The statement accused the US of attacking civilian targets and included expressions of Vietnamese determination to fight until final victory, no matter what escalation measures the US might introduce. Other propaganda statements in echoing the same line, condemned the "criminal acts" of the US and boasted that the Vietnamese people had "accurately and ferociously smashed the enemy's piratical attacks, and scored brilliant victories."

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13. [] Despite regime protestations of the high state of popular morale and of popular determination to defeat the US, isolated instances of dissatisfaction continue to be reported indicating that the air strikes are having some deleterious effect on popular morale. []

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[REDACTED]

[REDACTED] In addition, there continue to be reports of shortages of consumer commodities and difficulties associated with the evacuation of large numbers of the population. There is no good evidence, however, to indicate that there has been any weakening in the leadership's resolve to continue the war.

Effects on the Economy

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14. [REDACTED] The extent of damage caused by the air strikes against North Vietnam since the beginning of the ROLLING THUNDER program has been recomputed to incorporate more complete and later information regarding the effects of the attacks. Cumulative measurable losses to the economy and to the military establishment through November 1966 are now estimated at \$184 million.* Economic losses account for an increasing share of the bomb damage and now stand at almost two thirds the total damage or \$116 million. These costs have been broadly distributed throughout the economy. Direct damage to economic facilities and equipment amounts to about \$80 million. The targets responsible for the bulk of this loss are transportation equipment (\$35 million), bridges (\$22 million), electric power plants (\$12 million) and petroleum (\$6 million). Indirect

* US dollars are used throughout this appraisal.

losses resulting from reductions in exports, agricultural production and the output of the fishing industry account for nearly \$36 million. The \$68 million of damage to military facilities and equipment is accounted for chiefly by losses to aircraft (\$20 million), barracks (\$17 million), naval craft (\$9 million), supply depots (\$8 million), and SAM sites (\$6 million). (See Tab B). In addition, there continue to be many other losses and costs to the economy and the military establishment which cannot be assigned meaningful values. These include increased defense costs, the loss of production, lower productivity of labor and time lost from work as a consequence of civil defense measures.

25X1 15. [] Despite the cost of damage to the North Vietnamese economy, the value of foreign economic aid received is far in excess of estimated losses. Imports of machinery and equipment have played an especially important role in maintaining the transportation system in North Vietnam and in improving the communications system. In addition to providing transportation equipment, the Communist countries have increased deliveries of spare parts, machinery for the repair and maintenance of transport equipment and construction equipment for the reconstruction and repair of lines of communication.

25X1 16. [] Although the program to disperse industry continues, information is lacking on the magnitude of the program

and its impact on economic activity. It is also unclear if machinery is being removed from existing plants, or if dispersed sites are being provided with new machinery imported from other Communist countries. Technical constraints would, of course, probably prohibit effective dispersal of some industrial plants. Along with this program the Hanoi regime is again advocating in public statements the importance of developing local industry.

25X1 17. [] Air strikes continue to contribute to North Vietnamese agricultural problems. Hanoi's official statements suggest that the fall rice crop -- normally about two thirds of the annual harvest -- is below the average of some 2.8 million tons,* although no detailed statistical information has been released. A part of this short-fall is due to poor weather and other natural causes. Recent information also indicates that air strikes have seriously interfered with fishing activity. It is estimated that a 10,000 ton decrease in salt water fish production -- about 10 per cent of the annual catch -- has occurred since the air strikes started. Most of this reduction occurred in waters off the coast of the three southern provinces. The air strikes have also damaged fishing installations and fishing boats along the coast in this area.

25X1 18. [] Strikes against petroleum installations were at a lower rate in November than any month since May. However difficult

* Metric tons used throughout this appraisal.

and costly the supply and distribution of petroleum through the dispersal program may be, it appears to be adequate for North Vietnam's needs and has largely neutralized the effects of the loss of the principal storage sites. Local petroleum supply problems continue to be reported at construction sites in Military Region IV. These shortages have been attributed by the North Vietnamese to transportation difficulties caused by bad weather and poor administration and planning. It is estimated that supplies of petroleum in North Vietnam have not dropped below about 60 days supply at any time since 1 September.

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21. No adequate post-strike photography is available for evaluating the results of the November strikes against two electric power facilities. The estimate of the total generating capacity in North Vietnam put out of service by the air strikes remains, therefore, at 59,000 kilowatts, or 32 per cent of total installed generating capacity. Despite this destruction there has been only a minor effect on the economy. The Viet Tri, Hon Gai, and Bac Giang power plants, which have not been attacked, continue to supply the needs of the population and industry in the Hanoi-Haiphong area.

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RESULTS OF STRIKES ON NVN TARGETS a/ THRU 12 DECEMBER 1966 TABLE 360

Fixed Targets	Total Targets		Targets Struck		No. Atks	b/ Strike Sorties	% National Capacity g/	
	No. c/	Targeted d/ No(*) %	No(*) %	d/			Destroyed	In-active
Barracks	443 man	62 40.72	45 33.0		230	2388	22.68	
Ammo Depots	112.6 MT	18 96.7	13 75.7		52	1155	73.4	37.51
POL Storage*	133.5 MT	13 100	13 100		74	608	80.3	
Supply Depots	10550 SqFt	26 40.77	17 19.0		51	601	13.48	
Power Plants	187 KW	20 94.5	7 46.6		34	283	31.6	
Maritime Ports	7.8 ST/DY	6 95	6 28		24	230	13.0	2.63
Railroad Yards	33.7 ST/DY	4 78	2 19		19	157	9.3	
Explosive Plant	1 MT	1 100	1 100		3	28	71	
Airfields	23		4		12	359		
Naval Bases	15		3		20	219		
Bridges	61		48		259	2624		
Commo Install	45		2		2	15		
Radar Sites	50		5		73	430		
SAM Sites	151		58		112	388		
Locks & Dams	8		2		2	10		
Ferries	34		11		7	44		

* JCS targets only; does not include dispersed storage.

Total Sorties: 9714	Results f/
Armed Recce Sorties	Destroyed Damaged
88,521	Vessels 3877 6536
	Vehicles 2473 2349
	RR Stock 1484 1782

a/Assessments are based on best information received, will be refined as more accurate information becomes available.

b/Strike plus flak suppression sorties. Some applied to multiple targets; in this summary assigned to principal target.

c/National capacity in 1,000's where measurement shown.

d/Percentages of national capacity where appropriate.

e/Also numerous attacks during armed recce and other missions.

f/Also numerous installations, AA sites, bridges, etc, attacked and road and rail cuts made.

g/Per cent inactive due to dismantling or abandonment of facilities as a result of air strikes.

(*) These columns are not additive, since the number of installations, both targeted and struck in some cases, apply to more than one category of targets. (i.e., barracks, supply and ammo depots).

NOTE: For comparative purposes.

US world-wide ammo storage capacity is 6,936,000 metric tons (CONUS 5,719,000 MT).

US world-wide military POL storage capacity is 15,452,000 MT; national US commercial capacity is 151,325,000 MT; approximate average \$ value is 1 MT of POL products is \$28.

US world-wide military supply depot covered storage space is 137,100,000 sq. ft. (CONUS 121,300,000 sq. ft.).

Total kilowatt capacity of power plants serving metropolitan areas: New York - 7.6 million; Chicago - 6 million; Washington (DC and Md/suburbs only) - 2.4 million.

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Value of Damage to Economic and Military Facilities and
Equipment Attacked Under The ROLLING THUNDER Program
1965 and January - November 1966

<u>Economic Facilities and Equipment</u>		<u>Military Facilities and Equipment</u>	
<u>Direct Losses</u>	<u>Million US \$</u>	<u>Direct Losses</u>	<u>Million US \$</u>
Railroad/Highway Bridge	22.2*	Barracks	17.5*
Transportation Equipment	34.8	Ammunition Depots	4.7
Electric Power Plants	11.9*	Supply Depots	3.1
Petroleum	6.4*	Airfields	.4*
Manufacturing Facilities	1.9	Radar and Communications	2.7
Railroad Yards	.5*	Sites	
Maritime Ports	1.3*	SAM Sites	6.4
Miscellaneous Armed	1.2	Naval Bases	1.6*
Reconnaissance		Aircraft	19.7
		Naval Craft	8.9
		Miscellaneous Armed	2.9
		Reconnaissance	
Subtotal, Direct Losses	80.2	Total, Direct	67.9
<u>Indirect Losses</u>			
Exports	14.6		
Agriculture**	17.0		
Fishing	4.0		
Subtotal, Indirect Losses	35.6		
Total, Direct & Indirect	115.8		

	<u>Total</u>
	<u>Million US \$</u>
Economic	116
Military	68
	<u>184</u>

* Estimate is incomplete because of inadequate post-strike photography.

** It should be noted that losses of agricultural crops are arbitrarily attributed entirely to the indirect effects of the bombing. An unknown part of these losses is in fact due to weather and other natural causes.

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1 cy

NMCC

3 cys

ARMY:

CHIEF OF STAFF

2 cys

DCSOPS

1 cy

ACSFOR

1 cy

ACSI

1 cy

ACSI-CI

1 cy

ACSI-Eastern

1 cy

STAG

1 cy

NAVY:

CHIEF OF NAVAL OPERATIONS

2 cys

DNI

1 cy

OP-921E

1 cy

OP-922Y1

1 cy

OP-922Y2

1 cy

OP-92B1

1 cy

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AFSTRIKE	1 cy
CONTIC	1 cy
CINCALCOM	1 cy
CINCEUR	1 cy
CINCUSAREUR	1 cy
CINCUSAFE	1 cy
CINCNAVEUR	1 cy
CINCCONAD	1 cy
CIA	

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DIA:

DIADR	1 cy
DIADD	1 cy
DIASC-1	1 cy
JS	1 cy
CO-2C	1 cy
AP	1 cy
AP-2	1 cy
AP-2C2	10 cys
AP-2D1	1 cy
AP-2D2	1 cy
AP-3	1 cy
AP-4	1 cy
AP-4A	1 cy
AP-4A2 (Pent)	6 cys
AP-4A2 (AHS)	4 cys
AP-4B4	2 cys
AP-4C	3 cys
AP-8	2 cys
XX	1 cy
IT	1 cy

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